

STATUS OF CLAIMS

Claims 1 - 20 are pending.

Claims 1 – 20 stand finally rejected.

No claims have been amended.

REMARKS

Reconsideration of the subject application is respectfully requested.

Rejection of claims 1-19 under 35 U.S.C. 112, second paragraph

Claims 1-19 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Examiner states that it is unclear how bonds formed “preferentially” (as currently amended) at intersections of channels is intended to limit the claims. The Examiner states that support cannot be found in the specification with which to assist one in determining the scope of this limitation.

Initially, applicant points out that a search on the USPTO database identifies the term “preferentially” employed in the claims of 4815 issued U.S. patents. Thus, the term “preferentially” is commonly used in the claims of issued U.S. patents. The Office clearly recognizes that the term “preferentially” does not render a claim indefinite. In the context of the present application, one of ordinary skill in the art will understand that the expression “formed preferentially” means that the dangling bonds are formed with greater density per unit surface area in the reaction areas than in other areas of the surface. For example, Paragraph [0007], which states:

It is clear that specific areas of the silicon can be chosen to have dangling bonds to promote localized reactions enabling a nanostructure to form in a specific spot within the reaction chamber. Such localized reaction areas may also be formed using various layers of metal on either the silicon or the glass structure.

The Examiner has indicated that the mere use of field assisted bonding in a vacuum or inert atmosphere will inherently produce dangling bonds in all areas of the glass. See Office Action of July 25, 2005, page 3. Thus, assuming that the Examiner is correct, one of ordinary skill in the art will understand that while field assisted bonding in a vacuum or inert atmosphere may produce dangling bonds in all areas, Paragraph [0007] of the specification teaches preferential formation of dangling bonds at localized reaction areas.

The following portions of the specification demonstrate that those localized reaction areas are at intersections.

Paragraph [0011] teaches a vertical and horizontal array of micropipes forming an X-Y matrix to provide localized reaction sites at the cross points of the matrix. One of ordinary skill in the art will understand that Paragraph [0011] teaches that the localized reaction sites of Paragraph [0007] are at the cross points or intersections.

Paragraph [0019] teaches: "It is also envisioned that there will be an X-Y matrix of microtubes whereby each of the microtubes form an X-Y grid and therefore fluids can be injected at any point in X-Y grid to enable a fluid to reach a cross point or a local area. At this local area, there would be a small spot or opening. At this spot, there would be dangling oxygen bonds." Thus, Paragraph

[0019] teaches dangling oxygen bonds at a cross point, i.e., an intersection, of a matrix.

Paragraph [0020] teaches “The intersection between pipe 44 and pipe 45 creates a cross point 40, which is a localized area in the glass or silicon, where fluid can be introduced to the pipe. At the localized area, the molecule will exist and by the use of electric fields or other devices, one can now cause the migration of sodium ions and therefore produce oxygen ions which are dangling at that location.”

Hence, one skilled in the art upon reading the above passages in connection with the rest of the specification would understand how the term “preferentially” limits the scope of the claims.

Furthermore, the Examiner’s statement that support cannot be found in the specification with which to assist one in determining scope of this limitation is not a justification for finding claim language indefinite. The scope of terms in a claim is only interpreted during examination with reference to the specification when the specification provides definitions for terms appearing in the claims. “It is only when the specification provides definitions for terms appearing in the claims that the specification can be used in interpreting claim language. *In re Vogel*, 422 F.2d 438, 441, 164 USPQ 619, 622 (CCPA 1970).” MPEP 2111.01. The mere fact that a claim term is not used in the specification is not grounds for rejection of a claim as indefinite under Section 112, Paragraph 2. “Accordingly, a claim term that is not used or defined in the specification is not indefinite if the meaning of the claim term is discernible. *Bancorp Services, L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1372, 69 USPQ2d

1996, 1999-2000 (Fed. Cir. 2004) (holding that the disputed claim term "surrender value protected investment credits" which was not defined or used in the specification was discernible and hence not indefinite because "the components of the term have well recognized meanings, which allow the reader to infer the meaning of the entire phrase with reasonable confidence")." MPEP 2173.02. The meaning of the term "preferentially" is certainly discernable in the context of claim 1.

For at least the above reasons, removal of the rejection under Section 112, Paragraph 2 is respectfully requested.

Rejection of Claims 1-19 under 35 U.S.C. 112, First Paragraph, As Failing to Comply with the Written Description Requirement

The proper procedure for assertion of a Section 112, Paragraph 1, written description rejection, is set forth in the MPEP, in pertinent part, as follows:

In rejecting a claim, the examiner must set forth express findings of fact which support the lack of written description conclusion (see MPEP § 2163 for examination guidelines pertaining to the written description requirement). These findings should:

(A) Identify the claim limitation at issue;
MPEP Section 2163.04.

In the Office Action, the Examiner failed to identify the claim limitation at issue. The Office Action states, on page 2, that "the Examiner does not find support for limiting dangling bonds only to the intersections of channels of the device." The Office Action again states, on page 3, that the recitation of choosing locate dangling bonds in specific areas may enable bonds at intersections of the channels, it does not provide support limiting the invention to bonds solely at intersections of the channels. However, there is no such limitation in the claims.

For the foregoing reason alone, the rejection under 35 U.S.C. §112, Paragraph 1, should be withdrawn.

The remaining discussion will assume that the Examiner takes the position that the limitation "formed preferentially at said reaction sites" which was added in the prior Amendment, fails to meet the written description requirement of Section 112, Paragraph 1.

In determining whether claims conform to the written description requirement, "the disclosure need only reasonably convey to persons skilled in the art that the inventor had possession of the subject matter in question." *Fujikawa v. Wattanasin*, 93 F.3d 1559, 1570 (Fed. Cir. 1996); MPEP 2163. While the Examiner has taken the position that the blaze marks language of *Fujikawa* is also applicable here, that formulation applies only to the disclosure of chemical species:

As the Board recognized, however, *ipsis verbis* disclosure is not necessary to satisfy the written description requirement of section 112. Instead, the disclosure need only reasonably convey to persons skilled in the art that the inventor had possession of the subject matter in question. In re Edwards, 568 F.2d 1349, 1351-52, 196 U.S.P.Q. (BNA) 465, 467 (CCPA 1978). In other words, the question is whether Wattanasin's "application provides adequate direction which reasonably [would lead] persons skilled in the art" to the sub-genus of the proposed count. *Id.* at 1352, 196 U.S.P.Q. (BNA) at 467.

Many years ago our predecessor court graphically articulated this standard by analogizing a genus and its constituent species to a forest and its trees. As the court explained: It is an old custom in the woods to mark trails by making blaze marks on the trees. It is no help in finding a trail . . . to be confronted simply by a large number of unmarked trees. Appellants are pointing to trees. We are looking for blaze marks which single out particular trees. We see none.

In re Ruschig, 54 C.C.P.A. 1551, 379 F.2d 990, 994-95, 154 U.S.P.Q. (BNA) 118, 122 (CCPA 1967).

Fujikawa v. Wattanasin, 93 F.3d 1559, 1570 (Fed. Cir. 1996). In any event, the specification is replete with blaze marks indicating that dangling bonds are formed preferentially at reaction sites at intersections.

Support for the amendments is found in the specification, for example, at Paragraph [0007], which states:

It is clear that specific areas of the silicon can be chosen to have dangling bonds to promote localized reactions enabling a nanostructure to form in a specific spot within the reaction chamber. Such localized reaction areas may also be formed using various layers of metal on either the silicon or the glass structure.

The Examiner has indicated that the mere use of field assisted bonding in a vacuum or inert atmosphere will inherently produce dangling bonds in all areas of the glass. See Office Action of July 25, 2005, page 3. Thus, assuming that the Examiner is correct, one of ordinary skill in the art will understand that while field assisted bonding in a vacuum or inert atmosphere may produce dangling bonds in all areas, Paragraph [0007] of the specification teaches preferential formation of dangling bonds at localized reaction areas. The following portions of the specification demonstrate that those localized reaction areas are at intersections.

Paragraph [0011] teaches a vertical and horizontal array of micropipes forming an X-Y matrix to provide localized reaction sites at the cross points of the matrix. One of ordinary skill in the art will understand that Paragraph [0011] teaches that the localized reaction sites of Paragraph [0007] are at the cross points or intersections.

Paragraph [0019] teaches: "It is also envisioned that there will be an X-Y matrix of microtubes whereby each of the microtubes form an X-Y grid and

therefore fluids can be injected at any point in X-Y grid to enable a fluid to reach a cross point or a local area. At this local area, there would be a small spot or opening. At this spot, there would be dangling oxygen bonds.” Thus, Paragraph [0019] teaches dangling oxygen bonds at a cross point, i.e., an intersection, of a matrix.

Paragraph [0020] teaches “The intersection between pipe 44 and pipe 45 creates a cross point 40, which is a localized area in the glass or silicon, where fluid can be introduced to the pipe. At the localized area, the molecule will exist and by the use of electric fields or other devices, one can now cause the migration of sodium ions and therefore produce oxygen ions which are dangling at that location.”

The specification teaches that localized areas or reaction sites, which may be intersections of the channels, have dangling bonds. As the Examiner previously stated that application of an electric field would cause dangling bonds to form everywhere, one of ordinary skill in the art will understand that the above references to reaction sites at the intersections where dangling bonds are formed, in fact refer to the formation of dangling bonds preferentially, i.e., with greater density per unit surface area, at the localized areas or reaction sites at the intersections.

In view of the foregoing, it is abundantly clear that one of ordinary skill in the art could reasonably conclude that the inventor had possession of the claimed invention, including the limitation “having dangling bonds formed preferentially at said reaction sites.”

For at least the foregoing reasons, the rejection under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement, has been overcome.

35 U.S.C. 102 and 103 Rejections

Applicant respectfully requests reconsideration and removal of all rejections for at least the following reasons. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." See, M.P.E.P. §2131 citing Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Applicant respectfully submits the cited art fails to teach or suggest each of the recited limitations of any of the Claims and hence fails to anticipate any of the pending Claims.

The Examiner has apparently chosen to disregard the word "preferentially" in examining the claims for compliance with Sections 102 and 103. This is entirely improper, as demonstrated above, in view of the fact that the term "preferentially" is commonly used in claims and is regarded as definite, and, moreover, that even expressions which are indefinite must be considered in determining whether a claim is anticipated or obvious.

A claim limitation which is considered indefinite cannot be disregarded. If a claim is subject to more than one interpretation, at least one of which would render the claim unpatentable over the prior art, the examiner should reject the claim as indefinite under 35 U.S.C. 112, second paragraph (see MPEP § 706.03(d)) and should reject the claim over the prior art based on the interpretation of the claim that renders the prior art

applicable. *Ex parte Ionescu*, 222 USPQ 537 (Bd. Pat. App. & Inter. 1984) (Claims on appeal were rejected on indefiniteness grounds only; the rejection was reversed and the case remanded to the examiner for consideration of pertinent prior art.). Compare *In re Wilson*, 424 F.2d 1382, 165 USPQ 494 (CCPA 1970) (if no reasonably definite meaning can be ascribed to certain claim language, the claim is indefinite, not obvious) and *In re Steele*, 305 F.2d 859, 134 USPQ 292 (CCPA 1962) (it is improper to rely on speculative assumptions regarding the meaning of a claim and then base a rejection under 35 U.S.C. 103 on these assumptions).

MPEP §2143. Here the Examiner has engaged in precisely the practice prohibited by *In re Steele*, by relying on the speculative assumption that “preferentially formed” means that the bonds are formed on all areas of the substrate, and then basing rejections on that speculative assumption. Indeed, this assumption is not only speculative, but ignores the common meaning of “preferentially.”

Moreover, even if the Examiner were correct that the term “preferentially” lacked support in the specification, it would be improper to ignore the term.

When evaluating claims for obviousness under 35 U.S.C. 103, all the limitations of the claims must be considered and given weight, including limitations which do not find support in the specification as originally filed (i.e., new matter). *Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983) *aff’d mem.* 738 F.2d 453 (Fed. Cir. 1984) (Claim to a catalyst expressly excluded the presence of sulfur, halogen, uranium, and a combination of vanadium and phosphorous. Although the negative limitations excluding these elements did not appear in the specification as filed, it was error to disregard these limitations when determining whether the claimed invention would have been obvious in view of the prior art.).

MPEP §2143.03

For at least this reason, the Examiner has failed to provide a proper *prima facie* case of obviousness of claims 1 and 18.

1. Little Fails to Anticipate Claim 1

In the Office Action, the Examiner states that “oxygen ions would inherently form in all areas of the glass when field assisted bonding is used, including at the intersection of the channels.” Claim 1, as amended, recites, inter alia, “a plurality of channels, located between said glass and silicon interface, defining a plurality of reaction sites where said channels intersect and having dangling bonds formed preferentially at said reaction sites . . .” It is clear that Little neither teaches nor suggests reaction sites, nor reaction sites where dangling bonds are formed preferentially. Even assuming arguendo, that the Examiner is correct that the use of field assisted bonding in a vacuum or inert atmosphere would inherently result in the formation of some dangling bonds, such dangling bonds would be formed uniformly in Little, and in any event would not be formed, in the structure of Little, preferentially at reaction sites where channels intersect.

Accordingly, Applicant respectfully requests reconsideration and removal of the rejection of Claim 1 in view of Little.

2. Little Fails To Anticipate Claims 2-4, 6-11 and 18-19

Applicant respectfully requests reconsideration and removal of the rejections of Claims 2-4 and 6-11, as well, at least by virtue of these Claims’ ultimate dependency upon a patentably distinct base Claim 1.

In similar fashion, independent claim 18 analogously recites borosilicate glass having dangling bonds formed preferentially at intersections of at least two channels and providing localized reaction sites for receiving organic molecules recited to be

fabricated into a nanoscale molecular system. Little neither teaches nor suggests the above cited features and limitations of present Claim 18.

Reconsideration and removal of this rejection is requested. Applicant also respectfully requests reconsideration and removal of the rejection of Claim 19, at least by virtue of this claim's ultimate dependency from a patentably distinct base Claim 18.

3. Little Fails To Anticipate Claim 20

Independent Claim 20 recites, "An apparatus for fabricating nanoscale molecular systems, comprising: ... at least one edge protruding into at least one of said channels and being suitable for inducing a localized high electric field." The Examiner has stated with respect to Claim 20 that Little discloses all of the same structural elements made up of the same materials and therefor would inherently be capable of producing a high electric field when a voltage is applied to the structure. However, Little utterly fails to disclose the claimed "at least one edge protruding into at least one of said channels" and thus does not disclose the claimed structure.

The Examiner states, for the first time in the Final Office Action, that Little discloses two ways in which an "edge" would protrude into at least one of the channels. The Examiner states that the first is that the channel could be made up of a porous structure. The Examiner states that the other is an embodiment where the channels are in a serpentine formation.

It is respectfully submitted that a porous material does not necessarily have "at least one edge protruding into at least one of said channels" in the ordinary and customary meaning of "at least one edge protruding into at least one of said channels." A porous material may be understood to have a surface with spaces

defined therein, but one of ordinary skill would not understand the surface of a porous material, which defines a wall of a channel, as having “at least one edge protruding into” the channel. Moreover, one of ordinary skill would certainly not understand the surface of a porous material as having an edge suitable for inducing a localized high electric field. If the Examiner believes that a surface of a porous material would be understood by one of ordinary skill as providing an edge suitable for inducing a localized high electric field, then the Examiner should provide evidence for this assertion.

The Examiner has further stated that a serpentine form of channels in Little constitutes “at least one edge protruding into” the channel. However, the ordinary meaning of “protruding into” a channel communicates a partial narrowing of the channel. The word “protruding” may be defined as meaning extending out above or beyond a surface or boundary. A mere turn or serpentine nature of a channel does not, in the ordinary meaning of the term, provide an edge that extends out above or beyond a surface of a channel wall. If the Examiner maintains this interpretation, the Examiner is respectfully requested to provide evidence to support this interpretation.

The Examiner has again provided a speculative interpretation of claim language, and has only explained this speculative interpretation on final rejection. This practice results in protracted prosecution.

Furthermore, Little does not disclose or suggest such an edge “suitable for inducing a localized high electric field.” Indeed, while the Office Action states that the elements would inherently be capable of producing a high electric field when a voltage is applied, it is only as a result of the claimed structure, namely “at least one edge protruding into at least one of said channels,” that a localized high electric field is

produced. Little nowhere teaches a structure for producing a localized high electric field.

For at least the foregoing reasons, the rejection of claim 20 should be withdrawn.

4. Claims 5, 12, 13, 16 and 17 Are Patentable over the Combination of Little and Ashmead.

The rejection of claims 5, 12, 13, 16 and 17 over Little in view of Ashmead is respectfully traversed for at least the reason that one of ordinary skill in the art would not modify a micro miniature cryogenic device (i.e. refrigerator), as taught by Little, with features from a chemical processing apparatus as taught by Ashmead.

The Examiner has interpreted this argument as if Applicant had argued that Ashmead was non-analogous art. However, there is no motivation for one of ordinary skill in the art to apply the teachings of a chemical processing apparatus of Ashmead to Little.

With specific reference to claim 5, the Examiner states that it is merely the selection of another shape of channel formed by etching known to be effective in micro-reactors. However, the inclusion of a shape of channel in Ashmead, which teaches a chemical processing apparatus, would not demonstrate to one of ordinary skill in the art that such a shape would be effective in a refrigerator, such as that taught by Little.

With specific reference to claims 12 and 16, the Examiner argues that a desire to improve corrosion resistance would motivate one of ordinary skill to look to Ashmead. However, the Examiner has failed to identify any teaching in the prior art that corrosion is even a problem in micro miniature cryogenic devices. Absent some

suggestion or teaching that there is a problem of corrosion to be solved, there is no motivation for one of ordinary skill to apply the teachings of Ashmead.

In addition, the rejection is respectfully traversed on the grounds that each of claims 5, 12, 13, 16 and 17 depends from claim 1, which is allowable for at least the reasons set forth above.

5. Claim 17 Is Patentable over the Combination of Little, Ashmead and Christl, et al.

The rejection of claim 17 over the proposed combination of Little, Ashmead and Christl is traversed for at least the reasons that one of ordinary skill in the art would not be motivated to modify a micro miniature cryogenic device of Little using the teachings of Christl related to providing a corrosion-resistant coating for use in heat exchangers that may be exposed to highly corrosive storable liquid rocket fuels (col. 1, lines 33-36). The Examiner has again taken the position that this argument is based on the doctrine of non-analogous art. However, the Examiner has failed to identify a problem of corrosion in micro miniature refrigeration units that would motivate one of ordinary skill in the art to look to corrosion resistant coatings that are suitable for use with highly corrosive rocket fuels.

In addition, the rejection is respectfully traversed on the grounds that claim 17 depends from claim 1, which is allowable for at least the reasons set forth above.

6. Claims 14 and 15 Are Patentable over the Combination of Little in view of Robillard, et al.

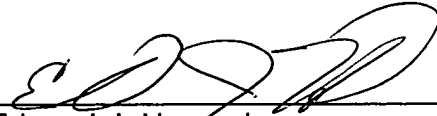
The rejection of Claims 14 and 15 over the proposed combination of Little and Robillard is traversed for at least the reasons that claims 14 and 15 depend from claim 1, which is allowable for at least the reasons set forth above.

CONCLUSION

Applicant believes he has addressed all outstanding grounds raised in the outstanding Office action, and respectfully submits the present case is in condition for allowance, early notification of which is earnestly solicited.

Should there be any questions or outstanding matters, the Examiner is cordially invited and requested to contact Applicant's undersigned attorney at his number listed below.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'E. J. Howard', written over a horizontal line.

Edward J. Howard

Reg. No. 42,670

Plevy, Howard & Darcy, P.C.

P.O. Box 226

Fort Washington, PA 19034

(215) 542-5824

(215) 542-5825 (fax)

Dated: April 10, 2006